SITE QUALITY ASSURANCE PROJECT PLAN (QAPP)

BAYONNE BARREL AND DRUM SITE
RAYMOND BOULEVARD, ESSEX COUNTY, NEW JERSEY

Prepared by

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Prepared for

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Approved by:

RST

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Site Project Manager

Date: 2/5/03

RST

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Quality Assurance Officer

Date: 2/5/03

EPA

____
Joseph Cosentino
On-Scene Coordinator

Date:__________

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1.0 INTRODUCTION

Presented herein is the site Quality Assurance Project Plan (QAPP) for the sampling event to be conducted at the Bayonne Barrel and Drum Site located off Raymond Boulevard in the Ironbound section of Newark, Essex County, New Jersey by the Region II Removal Support Team (RST). The site QAPP has been developed at the request of the United States Environmental Protection Agency (EPA) in accordance with the RST Generic Quality Assurance Project Plan (QAPP).

This plan is based on information currently available and may be modified on site in light of field screening results and/or other acquired information. All deviations from the QAPP will be noted in the Sampling Trip Report.

2.0 PROJECT DESCRIPTION

The Bayonne Barrel and Drum Site (BB&D) is located off Raymond Boulevard in the Ironbound section of Newark, Essex County, New Jersey(see Figure 1). BB&D is a former drum reconditioning facility occupying approximately 15 acres. The facility operated as an unlicenced treatment, storage, and disposal (TSD) facility from the early 1940's until the early 1980's when the company filed for bankruptcy. The site is bordered to the North and West by Routes 1 and 9, to the East by the New Jersey Turnpike and the South by a movie theater.

The operation produced a large amount of spent cleaning solutions, furnace ash and sludges. Approximately 40,000 pounds of incinerator ash and sludge were reportedly generated monthly. The storage of these wastes, as well as the storage of drums awaiting reconditioning, are believed to have been the chief source of site contamination.

The most recent EPA activity at the site was in 1999, during which time EPA's START contractor installed one monitoring well, repaired one monitoring well, and redeveloped and sampled 11 of the 12 on-site wells. Additionally, START surveyed the site, including all monitoring wells, conducted a 72 hr. groundwater flow study, and produced a groundwater contour map.

This sampling QAPP discusses the sampling and analysis of up to six soil samples that will be collected during the sampling event.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The EPA On-Scene Coordinator (OSC), Joseph Cosentino, will provide overall direction to the staff concerning project sampling needs, objectives and schedule. The RST Site Project Manager (SPM), Charles Metzger, will be the primary point of contact with the OSC. The RST SPM is responsible for the development and implementation of this Sampling Quality Assurance/Quality Control (QA/QC) Plan, project team organization, and supervision of all project tasks, including reporting and deliverables. The Site QC Coordinator, will be responsible for ensuring field adherence to the Sampling QA/QC Plan and recording of any deviations. The RST Quality Assurance Officer (QAO), Smita Sumbaly, will be the primary project team site contact with the subcontracted laboratory, if necessary.

RST will arrange for the laboratory analyses and transfer custody of the soil samples for shipment to the appropriate laboratory. The raw analytical data from the laboratory will be provided to the RST for data validation.

The following personnel will work on this project:

Personnel	Affiliation	Responsibility
Joseph Cosentino	Region II EPA	On-Scene Coordinator
Charles Metzger	Region II RST	Site Project Manager, Site QC, Site Health & Safety Officer, Sample Shipment
Sayed Iqbal	Region II RST	Soil Sampler
Russel Moult	Region II RST	Soil Sampler

The following laboratory will provide the following analyses:

Lab Name/Location	**Sample Type**	**Parameters**
Compuchem Laboratories 501 Madison Ave Cary, NC 27513	Soil	Toxicity Characteristic Leaching Procedure (TCLP) metals, Target Analyte List (TAL) metals, Cyanide

The OSC has requested a turnaround time of 72 hours for verbal and two weeks for written results.

4.0 DATA USE/QUALITY ASSURANCE OBJECTIVES

In addition to the following, the Data Use Objectives, QA Objectives procedure will be conducted in accordance with Sections A7, B2, B4, and B5 of the Region II RST QAPP. The objective of this sampling event is to collect five surface samples from the unpaved area within the facility. Results will help to determine possible disposal and remediation options for the contaminated soils on-site.

4.1 Data Quality Assurance Objectives

The overall Quality Assurance (QA) objective for chemical measurement data associated with this sampling event is to provide analytical results that are legally defensible in a court of law. The QA program will incorporate Quality Control (QC) procedures for field sampling, chain of custody, laboratory analyses, and reporting to assure generation of sound analytical results.

The EPA On-Scene Coordinator (OSC) has specified a critical level of QA-2 for the site. Details of this QA level are provided below.

4.2 QA Objectives

The following requirements apply to the respective QA Objectives and parameters identified.

The QA Protocols for a Level 2 QA objective sampling event are applicable to all sample matrices and include:

1. Sample documentation in the form of field logbooks, appropriate field data sheets, and chain of custody records (chain of custody records are optional for field screening locations).

2. Calibration of all monitoring and/or field-portable analytical equipment prior to collection and analyses of samples with results and/or performance check procedures/methods summarized and documented in a field, personal, and/or instrument log notebook.

3. Field or laboratory determined method detection limits (MDLs) will be recorded along with corresponding analytical sample results, where appropriate.

4. Analytical holding times as determined from the time of sample collection through analysis. These will be documented in the field logbook or by the laboratory in the final data deliverable package.

5. Initial and continuous instrument calibration data.

6. QC blank results (rinsate, trip, method, preparation, instrument, etc.), as applicable.

7. Collection and analysis of blind field duplicate and MS/MSD QC samples to provide a quantitative measure of the analytical precision and accuracy, as applicable.

8. Use of the following QC procedure for QC analyses and data validation:

   Definitive identification - confirm the identification of analytes on 100% of the "critical" samples, via an EPA-approved method; provide documentation such as gas chromatograms, mass spectra, etc.

The objective of this project/event applies to the following parameters:

TABLE 1

QUALITY ASSURANCE OBJECTIVES

QA Parameters	Matrix	Intended use of data	QA Objective
Toxicity Characteristic Leaching Procedure (TCLP) metals	Soil	Disposal suitability	QA-2
Target Analyte List (TAL) metals	Soil	Verify presence or absence of hazardous substances	QA-2
Cyanide	Soil	Verify presence or absence of hazardous substances	QA-2

A Field Sampling Summary is attached in Table 2 and a QA/QC Analysis and Objectives Summary is attached in Table 3. Section 5.1, Sampling Design, provides information on analyses to be performed on the individual soil samples.

TABLE 2

FIELD SAMPLING SUMMARY

Analytical Parameters	Matrix	Container Size	Preservative	Holding Time[1]	Subtotal Samples	Trip Blanks[3]	Rinsate Blanks[2]	Duplicate Samples[3]	MS/MSD Samples[3]	Total Field Samples
TAL metals	Soil	1 - 8 oz glass	Cool to 4°C	6 months, 28 days for Hg	5	NR	NR	1	1	6
Cyanide	Soil	1 - 8 oz glass	Cool to 4°C	14 days	5	NR	NR	1	1	6
TCLP metals	Soil	1- 8 oz glass	Cool to 4°C	180 days 28 days for Hg	5	NR	NR	1	1	6

1 Holding time from date of sampling.

2 Only required if non-dedicated sampling equipment to be used. NR - not required, dedicated sampling equipment to be used. Picks and shovels may be used to break the ground surface, if necessary.

3 Not required for QA-1 (screening)

TABLE 3

QA/QC ANALYSIS AND OBJECTIVES SUMMARY

Analytical Parameters	Matrix	Analytical Method Reference	QA/QC Quantitation Limits	QA Objective
TAL metals	Soil	SW846 Method 6010A or CLP ILMO 4.1	As per method	QA-2
Cyanide	Soil	SW846 Method 9012A	As per method	QA-2
TCLP metals	Soil	SW846 Methods 1311 and 6010A or CLP ILMO 4.1	As per method	QA-2

Note: CLP-format deliverables required for all data packages.

5.0 APPROACH AND SAMPLING METHODOLOGIES

In addition to the following, the Approach and Sampling Procedures will be conducted in accordance with Sections B1 and B4 of the Region II RST QAPP.

The following sampling activities will be conducted at the BB&D Site

- Soil Sampling

All sampling activities will be performed by the Region II RST, under the direction of the EPA On-Scene Coordinator (OSC). Any deviations from the sampling plan will be noted in the Sampling Trip Report.

5.1 Sampling Design

A maximum of five soil samples and one duplicate will be collected from a depth of 0 - 24". Soil sampling locations will be determined in the field by the OSC. Sampling locations will be recorded using Global Positioning Systems (GPS), and will be plotted on existing site maps.

5.2 Schedule of Activities

Proposed Start Date	Activity	End Date
January 22, 2003	Soil Sampling	January 22, 2003

5.3 Sampling Equipment

In order to avoid cross-contamination, all samples will be collected with dedicated, disposable sampling equipment. Soil samples will be collected with dedicated disposable trowels in order to avoid cross-contamination. Shovels, picks, and chisels will be utilized if necessary to break the surface of the ground.

5.4 Sample Identification System

Each soil sample collected and analyzed will be assigned specific numbers as follows:

Each sample collected by Region II RST will be designated by a code which will identify the site. The code will be a site-specific project tracking number. The code for the Bayonne Barrel and Drum Site is BB. The media type will follow the numeric code. A hyphen will separate the site code and media type. Specific media types are as follows:

S - Soil

After the media type, the sequential sample numbers will be listed; sample numbers will be identified as to their location on the site location and/or the location on the x and y coordinates of a sampling grid if applicable. A duplicate sample will be identified in the same manner as other samples and will be distinguished and documented in the field logbook.

5.5 Standard Operating Procedures (SOPs)

5.5.1 Sample Documentation

All sample documents will be legibly completed using waterproof ink. Any corrections or revisions will be made by lining once through the incorrect entry and initialing the error.

FIELD LOGBOOK

The field logbook is essentially a descriptive notebook detailing site activities and observations so that an accurate account of field procedures can be reconstructed in the writer's absence. Logbook entries should record (at a minimum) the following:

1. Site name and project number
2. Name(s) of personnel on site
3. Dates and times of all entries (military time preferred)
4. Descriptions of all site activities, site entry and exit times
5. Noteworthy events and discussions
6. Weather conditions
7. Site observations
8. Sample and sample location identification and description*
9. Subcontractor information and names of on-site personnel
10. Date and time of sample collections, along with chain of custody information
11. Record of photographs
12. Site sketches

* - The description of the sample location will be noted in such a manner as to allow the reader to reproduce the location in the field at a later date.

SAMPLE LABELS

Sample labels will clearly identify the particular sample and should include the following:

1. Site/project number;
2. Sample identification number;
3. Sample collection date and time;
4. Description of sample (grab or composite);
5. Sample preservation;
6. Analytical parameters; and
7. Name of sampler.

Sample labels will be written in waterproof ink and securely affixed to the sample container. Properly secured tie-on labels can also be used.

CUSTODY SEALS

Custody seals demonstrate that a sample container has not been tampered with, or opened. The individual in possession of the sample(s) will sign and date the seal, affixing it in such a manner that the container cannot be opened without breaking the seal. The name of this individual, along with a description of the sample packaging, will be noted in the field logbook.

5.5.2 Sampling SOPs

Soil sampling activities will be conducted in accordance with guidelines outlined in EPA/ERT Soil Sampling SOP #2012 (Attachment B).

5.5.3 Sample Handling and Shipment

Each of the sample bottles will be sealed and labeled according to the following protocol. Caps will be secured with custody seals. Bottle labels will contain all required information including the site/project code, sample number, time and date of collection, analyses requested, and preservative used. Sealed bottles will be placed in a zip lock plastic bag. The zip lock bag will be placed in large metal or plastic coolers, and padded with an absorbent material such as vermiculate. All packaging will conform to IATA Regulations for overnight carriers.

All sample documentation will be affixed to the underside of each cooler lid. The lid will be sealed and affixed on at least two sides with custody seals so that any sign of tampering is easily visible.

5.6 Sample Containers

All sample containers/cassettes will meet the QA/QC specifications in OSWER Directive 9240.0-05A, "Specifications and Guidance for Contaminant Free Sample Containers".

5.7 Disposal of PPE and contaminated sampling materials

All used PPE will be disposed in accordance with local, state, and federal regulations.

6.0 SAMPLE CUSTODY

In addition to the following, the Sample Custody procedure will be conducted in accordance with Section B3 of the Region II RST QAPP.

A chain of custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of custody will be noted and signed for, and a copy of this record kept by each individual who has signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal. Specific information regarding custody of the samples projected to be collected on the weekend will be noted in the field logbook.

The chain of custody record should include (at minimum) the following:

1. Sample identification number;
2. Sample information;
3. Sample location;

4. Sample date;
5. Name(s) and signature(s) of sampler(s);
6. Signature(s) of any individual(s) with control over samples.

A separate chain of custody form must accompany each container/cooler for each daily shipment. The chain of custody form must accompany each container/cooler, but not address samples in any other container/cooler. This practice maintains the chain of custody for all samples in case of mis-shipment.

7.0 FIELD INSTRUMENT CALIBRATION AND PREVENTIVE MAINTENANCE

In addition to the following, the Field Instrument and Preventative Maintenance procedure will be conducted in accordance with Section B6 of the Region II RST QAPP.

The sampling team is responsible for assuring that a calibration/maintenance log will be brought into the field and maintained for each measuring device. Each log will include at a minimum, where applicable:

- name of device and/or instrument calibrated
- device/instrument serial and/or ID number
- frequency of calibration
- date of calibration
- results of calibration
- name of person performing the calibration
- identification of the calibrant

Equipment to be used each day will be calibrated prior to the commencement of daily activities.

8.0 ANALYTICAL METHODS

Analytical methods to be utilized in the analyses of samples collected during this sampling event are detailed in Table 3.

9.0 DATA REDUCTION, VALIDATION, AND REPORTING

In addition to the following, the Data Reduction, Validation, and Reporting procedure will be conducted in accordance with Sections D1, D2, and D3 of the Region II RST QAPP.

9.1 Deliverables

The RST SPM, Charles Metzger, will maintain contact with the EPA OSC, Joseph Cosentino, to keep him/her informed about the technical and financial progress of this project. This communication will commence with the issuance of the work assignment and project scoping meeting. Activities under this project will be reported in status and trip reports and other deliverables (e.g., analytical reports, final reports) described herein. Activities will also be summarized in appropriate format for inclusion in monthly and annual reports.

The following deliverables will be provided under this project:

<u>TRIP REPORT</u>

A trip report will be prepared to provide a detailed accounting of what occurred during each sampling mobilization. The trip report will be prepared within one week of the last day of each sampling mobilization. Information will be provided on time of major events, dates, and personnel on site (including affiliations).

<u>MAPS/FIGURES</u>

Maps depicting site layout, contaminant source areas, and sample locations will be included in the trip report, as appropriate.

<u>ANALYTICAL REPORT</u>

An analytical report will be prepared for samples analyzed under this plan. Information regarding the analytical methods or procedures employed, sample results, QA/QC results, chain of custody documentation, laboratory correspondence, and raw data will be provided within this deliverable.

<u>DATA REVIEW</u>

A review of the data generated under this plan will be undertaken. The assessment of data acceptability or usability will be provided separately, or as part of the analytical report.

9.2 Data Validation

Data generated under this QA/QC Sampling Plan will be evaluated according to criteria contained in the Removal Program Data Validation Procedures that accompany OSWER Directive number 9360.4-1 and in accordance with Region II guidelines.

Laboratory analytical results will be assessed by the data reviewer for compliance with required precision, accuracy, completeness, representativeness, and sensitivity.

10.0 FIELD QUALITY CONTROL CHECKS AND FREQUENCY

In addition to the following, the Field Quality Control Checks and Frequency procedure will be conducted in accordance with Section B7 of the Region II RST QAPP.

This section details the Quality Assurance/Quality Control (QA/QC) requirements for field activities performed during the sampling effort.

QA/QC samples will include the collection of one field duplicate and one extra volume sample at a ratio of 1 per 20 samples. Extra sample volume will be submitted to allow the laboratory to perform matrix spike sample analysis. This analysis provides information about the effect of sample matrix on digestion and measurement methodology. Field duplicate samples provide an indication of analytical variability and analytical error and will not be identified to the laboratory.

11.0 SYSTEM AUDIT

In addition to the following, the System Audit procedure will be conducted in accordance with Section C1 of the Region II RST QAPP.

The Field QA/QC Officer will observe sampling operations and review subsequent analytical results to ensure compliance with the QA/QC requirements of the project/sampling event.

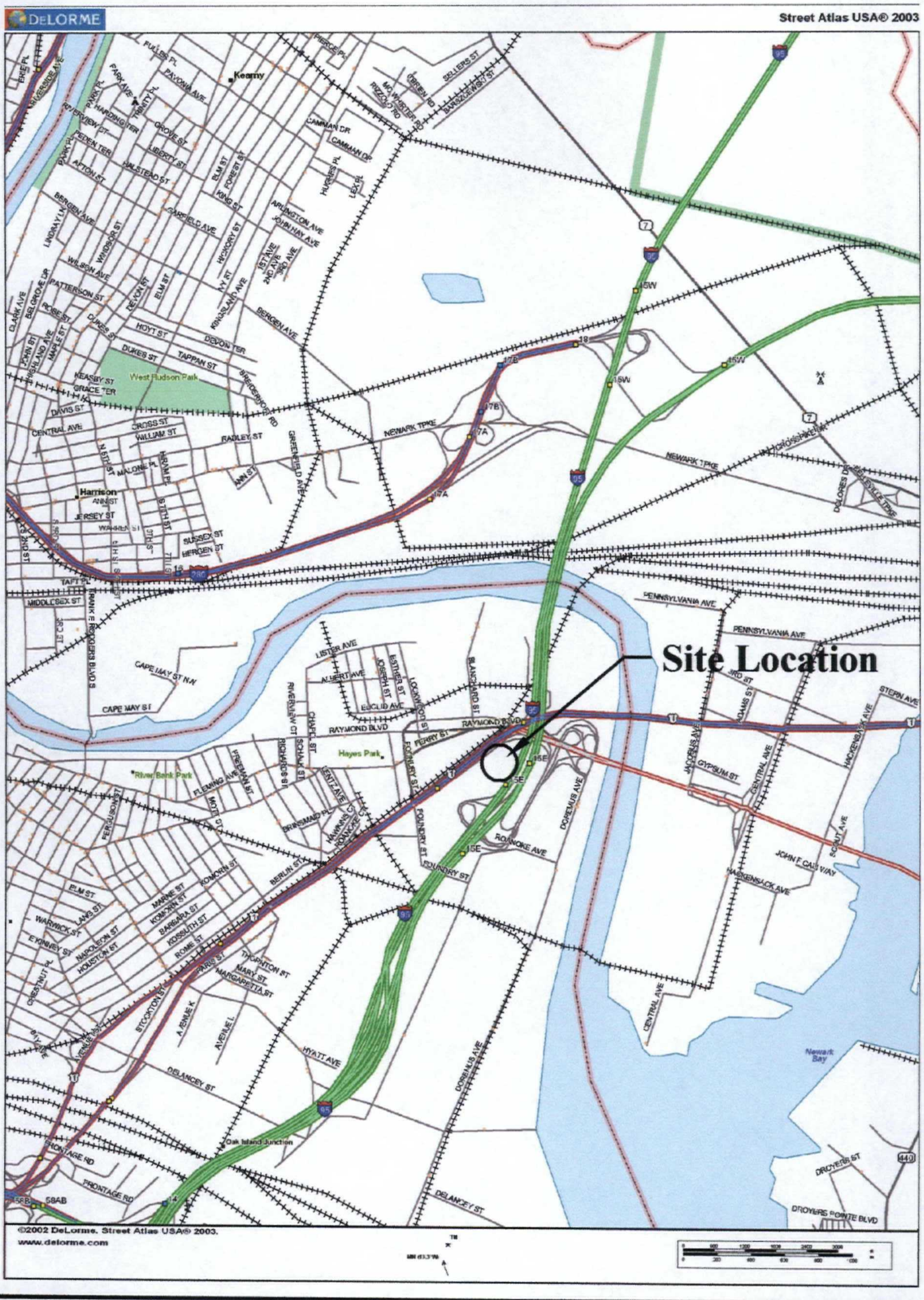
12.0 CORRECTIVE ACTION

In addition to the following, the Corrective Action procedure will be conducted in accordance with Section C1 of the Region II RST QAPP.

All provisions will be taken in the field and laboratory to ensure that any problems that may develop will be dealt with as quickly as possible to ensure the continuity of the project/sampling events. Any deviations from this sampling plan will be noted in the final report.

ATTACHMENT A

Site Map



Weston Solutions, Inc.
FEDERAL PROGRAMS DIVISION

Restoring Resource Efficiency

IN ASSOCIATION WITH RESOURCE APPLICATIONS, INC., INNOVATIVE TECHNOLOGICAL SOLUTIONS, INC., AND SCIENTIFIC AND ENVIRONMENTAL ASSOCIATES, INC.

EPA OSC J. Cosentino	Site Location Map
RST SPM C. Metzger	Bayonne Barrel and Drum Site

ATTACHMENT B

Soil Sampling, EPA/ERT SOP # 2012

SOIL SAMPLING

SOP#: 2012
DATE: 11/16/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to describe the procedures for the collection of representative soil samples. Analysis of soil samples may determine whether concentrations of specific pollutants exceed established action levels, or if the concentrations of pollutants present a risk to public health, welfare, or the environment.

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. Environmental Protection Agency (EPA) endorsement or recommendation for use.

2.0 METHOD SUMMARY

Soil samples may be collected using a variety of methods and equipment. The methods and equipment used are dependent on the depth of the desired sample, the type of sample required (disturbed vs. undisturbed), and the soil type. Near-surface soils may be easily sampled using a spade, trowel, and scoop. Sampling at greater depths may be performed using a hand auger, continuous flight auger, a trier, a split-spoon, or, if required, a backhoe.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

Chemical preservation of solids is not generally recommended. Samples should, however, be cooled and protected from sunlight to minimize any potential reaction.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

There are two primary interferences or potential problems associated with soil sampling. These include cross contamination of samples and improper sample collection. Cross contamination problems can be eliminated or minimized through the use of dedicated sampling equipment. If this is not possible or practical, then decontamination of sampling equipment is necessary. Improper sample collection can involve using contaminated equipment, disturbance of the matrix resulting in compaction of the sample or inadequate homogenization of the samples where required, resulting in variable, non-representative results.

5.0 EQUIPMENT/APPARATUS

Soil sampling equipment includes the following:

- Sampling plan
- Maps/plot plan
- Safety equipment, as specified in the Health and Safety Plan
- Survey equipment
- Tape measure
- Survey stakes or flags
- Camera and film
- Stainless steel, plastic, or other appropriate homogenization bucket, bowl or pan
- Appropriate size sample containers
- Ziplock plastic bags
- Logbook
- Labels
- Chain of Custody records and seals
- Field data sheets
- Cooler(s)
- Ice
- Vermiculite
- Decontamination supplies/equipment
- Canvas or plastic sheet
- Spade or shovel

- Spatula
- Scoop
- Plastic or stainless steel spoons
- Trowel
- Continuous flight (screw) auger
- Bucket auger
- Post hole auger
- Extension rods
- T-handle
- Sampling trier
- Thin wall tube sampler
- Split spoons
- Vehimeyer soil sampler outfit
  - Tubes
  - Points
  - Drive head
  - Drop hammer
  - Puller jack and grip
- Backhoe

6.0 REAGENTS

Reagents are not used for the preservation of soil samples. Decontamination solutions are specified in the Sampling Equipment Decontamination SOP and the site specific work plan.

7.0 PROCEDURES

7.1 Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies required.

2. Obtain necessary sampling and monitoring equipment.

3. Decontaminate or pre-clean equipment, and ensure that it is in working order.

4. Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.

5. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety Plan.

6. Use stakes, flagging, or buoys to identify and mark all sampling locations. Specific site factors, including extent and nature of contaminant should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions. All staked locations will be utility-cleared by the property owner prior to soil sampling.

7.2 Sample Collection

7.2.1 Surface Soil Samples

Collection of samples from near-surface soil can be accomplished with tools such as spades, shovels, trowels, and scoops. Surface material can be removed to the required depth with this equipment, then a stainless steel or plastic scoop can be used to collect the sample.

This method can be used in most soil types but is limited to sampling near surface areas. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. A stainless steel scoop, lab spoon, or plastic spoon will suffice in most other applications. The use of a flat, pointed mason trowel to cut a block of the desired soil can be helpful when undisturbed profiles are required. Care should be exercised to avoid use of devices plated with chrome or other materials. Plating is particularly common with garden implements such as potting trowels.

The following procedure is used to collect surface soil samples:

1. Carefully remove the top layer of soil or debris to the desired sample depth with a pre-cleaned spade.

2. Using a pre-cleaned, stainless steel scoop, plastic spoon, or trowel, remove and discard a thin layer of soil from the area which came in contact with the spade.

3. If volatile organic analysis is to be performed, transfer the sample directly into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or

other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval or location into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.2 Sampling at Depth with Augers and Thin Wall Tube Samplers

This system consists of an auger, or a thin-wall tube sampler, a series of extensions, and a "T" handle (Figure 1, Appendix A). The auger is used to bore a hole to a desired sampling depth, and is then withdrawn. The sample may be collected directly from the auger. If a core sample is to be collected, the auger tip is then replaced with a thin wall tube sampler. The system is then lowered down the borehole, and driven into the soil to the completion depth. The system is withdrawn and the core is collected from the thin wall tube sampler.

Several types of augers are available; these include: bucket type, continuous flight (screw), and post-hole augers. Bucket type augers are better for direct sample recovery since they provide a large volume of sample in a short time. When continuous flight augers are used, the sample can be collected directly from the flights. The continuous flight augers are satisfactory for use when a composite of the complete soil column is desired. Post-hole augers have limited utility for sample collection as they are designed to cut through fibrous, rooted, swampy soil and cannot be used below a depth of three feet.

The following procedure will be used for collecting soil samples with the auger:

1. Attach the auger bit to a drill rod extension, and attach the "T" handle to the drill rod.

2. Clear the area to be sampled of any surface debris (e.g., twigs, rocks, litter). It may be advisable to remove the first three to six inches of surface soil for an area approximately six inches in radius around the drilling location.

3. Begin augering, periodically removing and depositing accumulated soils onto a plastic sheet spread near the hole. This prevents accidental brushing of loose material back down the borehole when removing the auger or adding drill rods. It also facilitates refilling the hole, and avoids possible contamination of the surrounding area.

4. After reaching the desired depth, slowly and carefully remove the auger from boring. When sampling directly from the auger, collect the sample after the auger is removed from the boring and proceed to Step 10.

5. Remove auger tip from drill rods and replace with a pre-cleaned thin wall tube sampler. Install the proper cutting tip.

6. Carefully lower the tube sampler down the borehole. Gradually force the tube samplerinto soil. Care should be taken to avoid scraping the borehole sides. Avoid hammering the drill rods to facilitate coring as the vibrations may cause the boring walls to collapse.

7. Remove the tube sampler, and unscrew the drill rods.

8. Remove the cutting tip and the core from the device.

9. Discard the top of the core (approximately 1 inch), as this possibly represents material collected before penetration of the layer of concern. Place the remaining core into the appropriate labeled sample container. Sample homogenization is not required.

10. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the

caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly.

When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

11. If another sample is to be collected in the same hole, but at a greater depth, reattach the auger bit to the drill and assembly, and follow steps 3 through 11, making sure to decontaminate the auger and tube sampler between samples.

12. Abandon the hole according to applicable State regulations. Generally, shallow holes can simply be backfilled with the removed soil material.

7.2.3 Sampling at Depth with a Trier

The system consists of a trier, and a "T" handle. The auger is driven into the soil to be sampled and used to extract a core sample from the appropriate depth.

The following procedure will be used to collect soil samples with a sampling trier:

1. Insert the trier (Figure 2, Appendix A) into the material to be sampled at a 0° to 45° angle from horizontal. This orientation minimizes the spillage of sample.

2. Rotate the trier once or twice to cut a core of material.

3. Slowly withdraw the trier, making sure that the slot is facing upward.

4. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

7.2.4 Sampling at Depth with a Split Spoon (Barrel) Sampler

The procedure for split spoon sampling describes the collection and extraction of undisturbed soil cores of 18 or 24 inches in length. A series of consecutive cores may be extracted with a split spoon sampler to give a complete soil column profile, or an auger may be used to drill down to the desired depth for sampling. The split spoon is then driven to its sampling depth through the bottom of the augured hole and the core extracted.

When split spoon sampling is performed to gain geologic information, all work should be performed in accordance with ASTM D 1586-67 (reapproved 1974).

The following procedures will be used for collecting soil samples with a split spoon:

1. Assemble the sampler by aligning both sides of barrel and then screwing the drive shoe on the bottom and the head piece on top.

2. Place the sampler in a perpendicular position on the sample material.

3. Using a well ring, drive the tube. Do not drive past the bottom of the head piece or compression of the sample will result.

4. Record in the site logbook or on field data sheets the length of the tube used to penetrate the material being sampled, and the number of blows required to obtain this depth.

5. Withdraw the sampler, and open by unscrewing the bit and head and splitting the barrel. The amount of recovery and soil type should be recorded on the boring log. If a split sample is desired, a cleaned, stainless steel knife should be used to divide the tube contents in half, longitudinally. This sampler

is typically available in 2 and 3 1/2 inch diameters. However, in order to obtain the required sample volume, use of a larger barrel may be required.

6. Without disturbing the core, transfer it to appropriate labeled sample container(s) and seal tightly.

7.2.5 Test Pit/Trench Excavation

These relatively large excavations are used to remove sections of soil, when detailed examination of soil characteristics (horizontal, structure, color, etc.) are required. It is the least cost effective sampling method due to the relatively high cost of backhoe operation.

The following procedures will be used for collecting soil samples from test pit/trench excavations:

1. Prior to any excavation with a backhoe, it is important to ensure that all sampling locations are clear of utility lines, subsurface pipes and poles (subsurface as well as above surface).

2. Using the backhoe, a trench is dug to approximately three feet in width and approximately one foot below the cleared sampling location. Place excavated soils on plastic sheets. Trenches greater than five feet deep must be sloped or protected by a shoring system, as required by OSHA regulations.

3. A shovel is used to remove a one to two inch layer of soil from the vertical face of the pit where sampling is to be done.

4. Samples are taken using a trowel, scoop, or coring device at the desired intervals. Be sure to scrape the vertical face at the point of sampling to remove any soil that may have fallen from above, and to expose fresh soil for sampling. In many instances, samples can be collected directly from the backhoe bucket.

5. If volatile organic analysis is to be performed, transfer the sample into an appropriate, labeled sample container with a stainless steel lab spoon, or equivalent and secure the cap tightly. Place the remainder of the sample into a stainless steel, plastic, or other appropriate homogenization container, and mix thoroughly to obtain a homogenous sample representative of the entire sampling interval. Then, either place the sample into appropriate, labeled containers and secure the caps tightly; or, if composite samples are to be collected, place a sample from another sampling interval into the homogenization container and mix thoroughly. When compositing is complete, place the sample into appropriate, labeled containers and secure the caps tightly.

6. Abandon the pit or excavation according to applicable state regulations. Generally, shallow excavations can simply be backfilled with the removed soil material.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

There are no specific quality assurance (QA) activities which apply to the implementation of these procedures. However, the following QA procedures apply:

1. All data must be documented on field data sheets or within site logbooks.

2. All instrumentation must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout and calibration activities must occur prior to sampling/operation, and they must be documented.

10.0 DATA VALIDATION

This section is not applicable to this SOP.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OHSA and corporate health and safety procedures.

12.0 REFERENCES

Mason, B.J., Preparation of Soil Sampling Protocol: Technique and Strategies. 1983 EPA-600/4-83-020.

Barth, D.S. and B.J. Mason, Soil Sampling Quality Assurance User's Guide. 1984 EPA-600/4-84-043.

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de Vera, E.R., B.P. Simmons, R.D. Stephen, and D.L. Storm. Samplers and Sampling Procedures for Hazardous Waste Streams. 1980 EPA-600/2-80-018.

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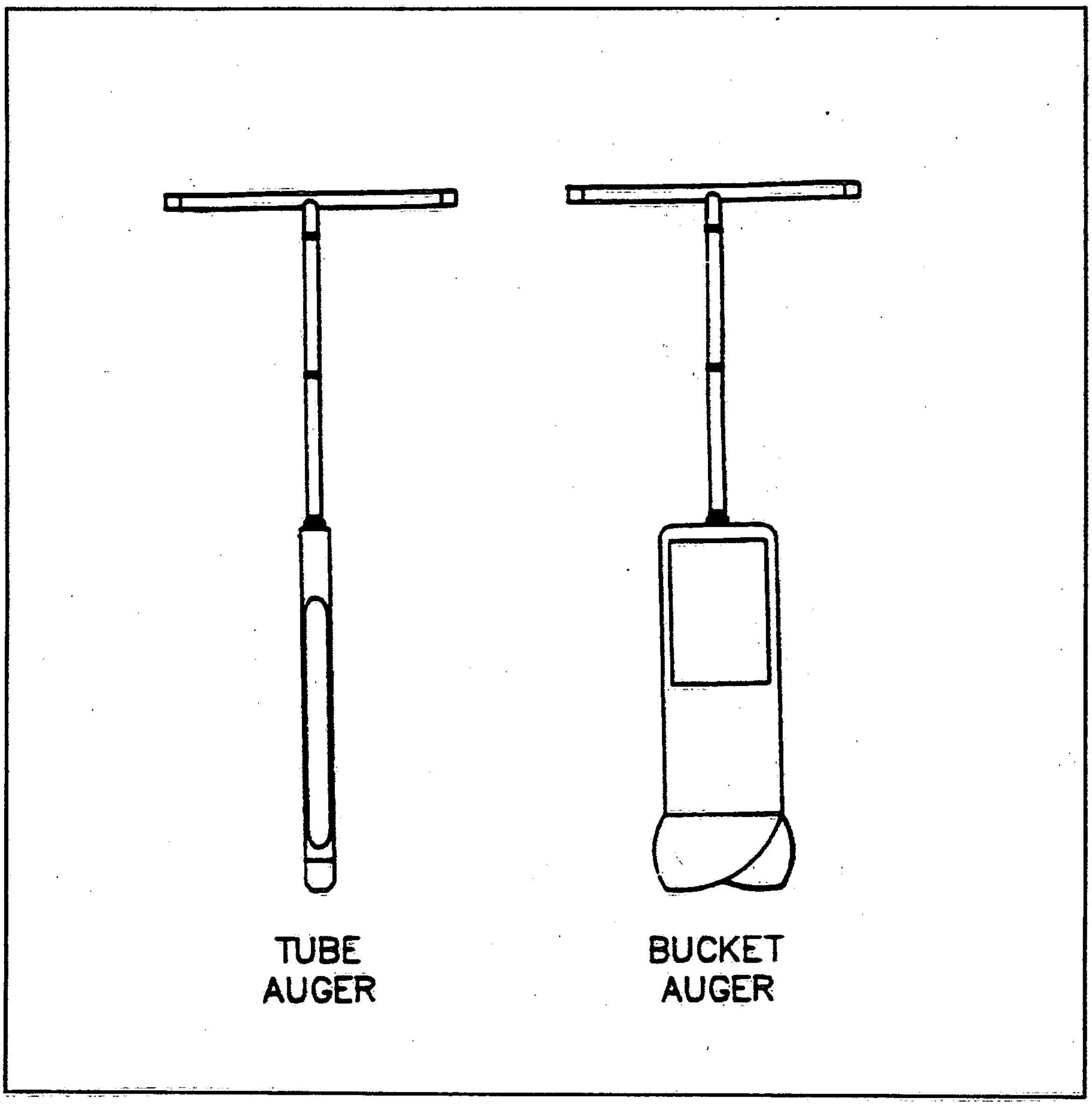
APPENDIX A

Figures

FIGURE 1. Sampling Augers



APPENDIX A (Cont'd)

Figures

FIGURE 2. Sampling Trier